
**Fire protection — Automatic sprinkler
systems —**

**Part 12:
Requirements and test methods for
grooved-end components for steel
pipe systems**

*Protection contre l'incendie — Systèmes d'extinction automatiques du
type sprinkler —*

*Partie 12: Exigences et méthodes d'essai pour les raccords de
tuyauterie en acier à extrémités rainurées*



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 21, *Equipment for fire protection and fire fighting*, Subcommittee SC 5, *Fixed firefighting systems using water*.

This third edition cancels and replaces the second edition (ISO 6182-12:2014), which has been technically revised. The main changes compared to the previous edition are as follows:

— Updated tables on groove dimensions are included.

A list of all the parts in the ISO 6182 series, can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Fire protection — Automatic sprinkler systems —

Part 12:

Requirements and test methods for grooved-end components for steel pipe systems

1 Scope

This document specifies performance requirements, grooving dimensions, test methods and marking requirements for couplings used in the joining of grooved steel tubes, pipes, grooved-end fittings and other grooved-end components up to 300 DN nominal diameter.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 37, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties*

ISO 188, *Rubber, vulcanized or thermoplastic — Accelerated ageing or heat resistance tests*

ISO 898-1:2013, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs*

ISO 898-2:2012, *Mechanical properties of fasteners — Part 2: Nuts with specified proof load values — Coarse thread*

ISO 1083:2018, *Spheroidal graphite cast irons — Classification*

ISO 4200:1991, *Plain end steel tubes, welded and seamless — General tables of dimensions and masses per unit length*

ASTM A47/A47M-99 (2004), *Standard Specification for Ferritic Malleable Iron Castings*

ASTM A183, *Standard Specification for Carbon Steel Track Bolts and Nuts*

ASTM A536-84 (2004), *Standard Specification for Ductile Iron Castings*

ASTM A563-07a, *Standard Specification for Carbons and Alloy Steel Nuts*

ASTM B633-07, *Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel*

ASTM D395-03, *Standard Test Methods for Rubber Property — Compression Set*

EN 12329, *Corrosion protection of metals — Electrodeposited coatings of zinc with supplementary treatment on iron or steel*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1.1

grooved-end components

pipe, tubes, fittings and other devices that are used to form grooved mechanical coupling joints

3.1.2

mechanical coupling

device consisting of two or more housings, fasteners such as bolts and nuts and a pressure-responsive gasket, used to mechanically join *grooved-end components* (3.1.1) to form a sealed joint

3.1.3

flexible mechanical coupling

mechanical coupling forming a sealed joint in which there is limited angular, axial and rotational movement without overstressing the pipe joint

Note 1 to entry: See 6.8.

3.1.4

rigid mechanical coupling

mechanical coupling forming a sealed joint in which there is essentially no free angular, axial or rotational movement

3.1.5

reducing mechanical coupling

mechanical coupling used to join *grooved-end components* (3.1.1) of different outside diameters (ODs)

3.1.6

mechanical coupling housing

structural parts of a *mechanical coupling* (3.1.2) that mechanically fit onto *grooved-end components* (3.1.1) to provide physical restraint and enclosure of the gasket

3.1.7

pressure-responsive gasket

gasket that improves its seal with the application of pressure, i.e. additional pressure results in additional force between the gasket and the surface to which it is sealing

3.1.8

rated working pressure

maximum service pressure at which a grooved piping system is intended to operate

3.2 Abbreviated terms

OD	outside diameter
----	------------------

4 Product consistency

It shall be the responsibility of the manufacturer to implement a quality-control programme to ensure that production consistency meets the requirements of this document in the same manner as the originally tested samples.

5 Product assembly

Product assembly shall be in accordance with the installation instructions in 8.3.

6 Requirements

6.1 Grooved-end dimensions

6.1.1 Grooved ends shall be dimensionally compatible with the coupling.

NOTE See [Annexes A, B and C](#) for typical dimensions.

6.2 Minimum pipe wall thickness

6.2.1 Grooved-end pipe couplings tested in accordance with [7.7.1](#) shall be tested with pipes according to ISO 4200:1991, Table 1, range D. Pipes with a higher wall thickness may be used if this corresponds to the minimum wall thickness specified by the manufacturer.

6.2.2 Grooved-end pipe couplings tested in accordance with [7.7.2](#) shall be tested with pipe having the minimum nominal wall thickness specified in the manufacturer's installation instructions.

6.3 Mechanical coupling housing

The casting materials of the housings shall be ductile iron in accordance with ISO 1083:2018, Grade 400-15; ASTM A536-84(2004), Grade 65-45-12 or malleable iron in accordance with ASTM A47/A47M-99(2004), Grade 32510 or 32518; or material having at least equivalent strength and corrosion resistance.

6.4 Pressure-responsive gasket

Materials for the coupling gaskets shall be ethylene-propylene diene monomer-rubber (EPDM), nitrile, silicone rubber or other elastomeric materials suitable for the intended service.

6.5 Bolts

Oval neck track head bolts shall be in accordance with ISO 898-1:2013, minimum Class 8.8, heavy hex bolts in accordance with ASTM A183 or other bolts which prevent rotation and have a minimum tensile strength of 800 N/mm². Bolts shall be zinc plated in accordance with ASTM B633-07, SC1, or EN 12329, or be of a material that provides at least equivalent corrosion resistance.

6.6 Nuts

Nuts shall be hexagon nuts in accordance with ISO 898-2:2012, minimum Class 8, or heavy (large) hexagon nuts in accordance with ASTM A563-07a, Grade B or equivalent. Nuts shall be zinc plated in accordance with ASTM B633-07, SC1, or EN 12329, or be of a material that provides at least the equivalent corrosion resistance.

6.7 Hinge pins

Hinge pins, if provided, shall be a ferrous material, zinc plated in accordance with ASTM B633-07, Class FE/Zn5, or EN 12329, or be of a material that provides at least the equivalent corrosion resistance.

6.8 Flexible coupling

A flexible mechanical coupling shall permit axial displacement, rotation and at least 1° of angular movement for pipe diameter sizes less than 200 OD and 0,5° for pipe diameter sizes 200 OD and greater without inducing harm on the joint when tested in accordance with [7.7](#).

6.9 Vacuum (see 7.2)

The coupling assembly shall maintain a vacuum of 0,08 MPa (0,8 bar) for a period of 5 min without leakage when tested in accordance with 7.2.

6.10 Air leakage (see 7.3)

The coupling assembly shall show no evidence of air leakage when tested in accordance with 7.3.

6.11 Low-temperature exposure (see 7.4)

The coupling assembly shall show no evidence of air leakage when tested in accordance with 7.4.

6.12 Heat aging (see 7.5)

The coupling assembly shall show no evidence of air leakage or cracking of the gasket when tested in accordance with 7.5.

6.13 Hydrostatic pressure (see 7.6)

The coupling assembly shall show no evidence of leakage, fracture or rupture when tested in accordance with 7.6.

6.14 Bending moment (see 7.7)

The coupling assembly shall show no evidence of fracture or rupture or evidence of water leakage when tested in accordance with 7.7.1 or 7.7.2.

6.15 Gasket material evaluation

6.15.1 Compression set

Compression set shall not exceed 25 % when tested in accordance with ASTM D395-03, method B.

6.15.2 Tensile strength and elongation

6.15.2.1 Gasket materials shall have the following properties when tested in accordance with ISO 37:

- a) for silicone rubber (having poly-organo-siloxan as its constituent characteristics), a minimum tensile strength of 3,4 MPa (34 bar) and a minimum ultimate elongation of 100 %; or
- b) for natural rubber and a synthetic rubber other than silicone rubber, a minimum tensile strength of 10,3 MPa (103 bar) and a minimum ultimate elongation of 150 %, or a minimum tensile strength of 15,2 MPa (152 bar) and a minimum ultimate elongation of 100 %.

6.15.2.2 When tested in accordance with ISO 188, the physical properties of the gasket material after oven ageing at 100 °C for 70 h shall be at least 60 % of the as-received tensile strength and elongation values. Any change in the hardness shall not exceed 5 % of the as-received value.

6.16 Fire resistance (see 7.8)

The design of the coupling system should be such that a joint shall not leak in excess of single drops, i.e. not in form of flowing water or water spray, after a fire test in accordance with 7.8.

NOTE In some countries this test is not mandatory.

6.17 Rated working pressure

The rated working pressure of a coupling shall not be less than 1,2 MPa (12 bar).

6.18 Nominal sizes

The size of a coupling shall be in accordance with the pipe sizes given in ISO 4200.

7 Test methods

7.1 Test conditions and assembly

7.1.1 Test conditions

All tests shall be performed at an ambient temperature of $(24 \pm 5) ^\circ\text{C}$, if not otherwise specified. Unless otherwise specified, the tolerance for all testing parameters shall be $\pm 5\%$.

7.1.2 Test assembly

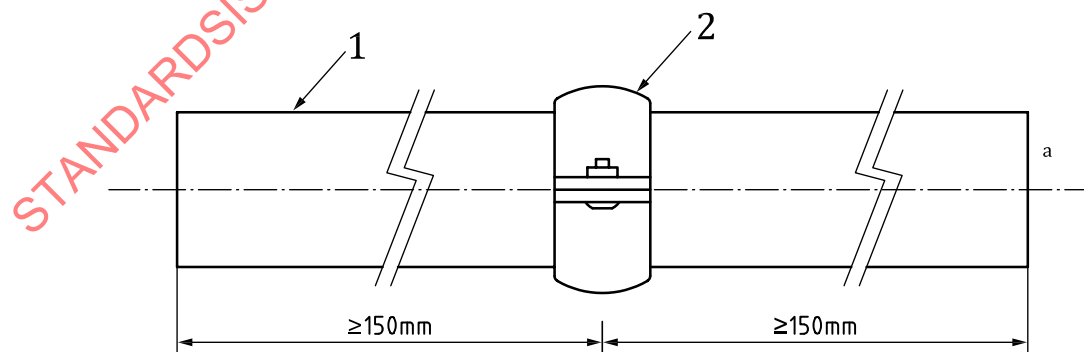
Unless otherwise specified, the test assembly shall consist of two sections of piping, each at least 150 mm long fitted with end caps. See [Figure 1](#). The test coupling shall be assembled in accordance with the manufacturer's installation instructions.

7.2 Vacuum (see [6.9](#))

7.2.1 The test assembly (see [Figure 1](#)) shall be equipped with a vacuum gauge to permit visual verification of the actual vacuum being applied.

7.2.2 Using a suitable vacuum pump, the test assembly shall be subjected to an internal vacuum pressure of 0,08 MPa (0,8 bar), and then isolated by closing shut off valves located between the test sample and the vacuum pump. The 0,08 MPa (0,8 bar) vacuum pressure may be re-established, if necessary, following an appropriate stabilization period.

7.2.3 Once the vacuum pressure has been established, there shall be no increase of more than 0,01 MPa (0,1 bar) below relative ambient pressure during the 5 min test period.



Key

- 1 pipe section
- 2 pipe coupling
- a Pipe tap provided in the end.

Figure 1 — Test assembly

7.3 Air leakage (see 6.10)

7.3.1 The test assembly (see Figure 1) shall be equipped with pressure measuring equipment to permit visual verification of the internal pressure being applied.

7.3.2 The air pressure shall then be increased to 0,3 MPa (3 bar) and held for 5 min and then soapy water or leakage test fluid applied.

CAUTION — Pneumatic pressure testing requires appropriate safety precautions.

7.3.3 There shall be no loss of air pressure of more than 0,01 MPa (0,1 bar) observed by pressure measuring equipment or evidence of leakage during a 5 min test period.

7.4 Low-temperature exposure (see 6.11)

7.4.1 The test assembly (see Figure 1) shall be equipped with a pressure gauge to permit visual verification of the pressure being applied.

7.4.2 Water to the depth of 3 mm shall be added to the horizontal assembly. The assembly and water shall be at an ambient temperature of $(24 \pm 5) ^\circ\text{C}$. The assembly shall then be pressurized with air to 0,3 MPa (3 bar), sealed, checked for leakage as specified in 7.3.2, and then placed in a chamber at $-40 ^\circ\text{C}$ in the horizontal position for a period of 24 h. Following the exposure, the assembly shall be restored to ambient temperature.

CAUTION — Pneumatic pressure testing requires appropriate safety precautions.

7.4.3 The air pressure in the assembly shall be observed to return to 0,3 MPa (3 bar) within 24 h. There shall be no loss of air pressure of more than 0,01 MPa (0,1 bar).

7.5 Heat aging (see 6.12)

7.5.1 The test assembly (see Figure 1) shall be initially pressurized to 0,3 MPa (3 bar) to check for leakage as specified in 7.3.2, then depressurized and placed in the oven at $135 ^\circ\text{C}$ for 45 days.

CAUTION — Pneumatic pressure testing requires appropriate safety precautions.

7.5.2 Following exposure, the assembly shall be conditioned at an ambient temperature of $(24 \pm 5) ^\circ\text{C}$ for a minimum of 24 h. The test assembly shall then be submerged in water and pressurized with air to 0,3 MPa (3 bar) for 5 min.

CAUTION — Pneumatic pressure testing requires appropriate safety precautions.

7.5.3 There shall be no loss of air pressure observed by the formation of air bubbles at the test coupling during the 5 min test period.

7.5.4 The test assembly shall be disassembled and the gasket shall not crack when two diametrically opposite points are squeezed together by hand until they touch. Gaskets intended for use with components 200 OD and larger shall also not crack when opposite sides are twisted by hand into a half turn.

7.6 Hydrostatic pressure test (see 6.13)

7.6.1 The test assembly (see Figure 1) shall be filled with water and purged of any entrapped air.

CAUTION — Hydrostatic pressure testing requires appropriate safety precautions.

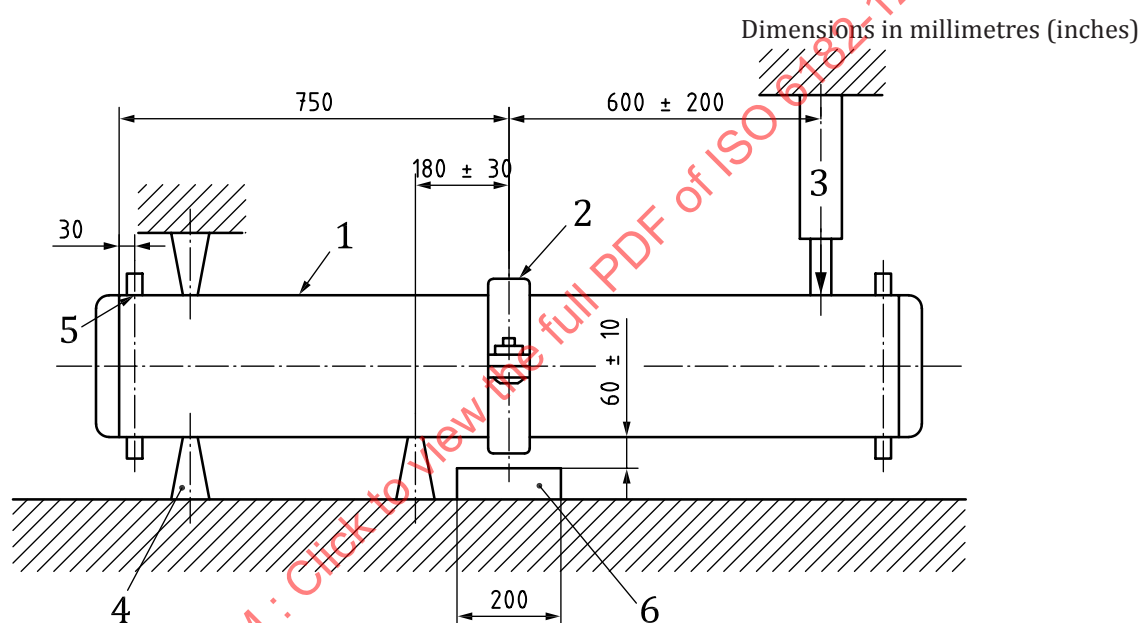
7.6.2 Hydrostatic pressure shall be increased at a rate not exceeding 2,0 MPa/min (20 bar/min) until an internal pressure level equal to four times the rated working pressure is attained. This pressure shall be maintained for 5 min.

7.6.3 There shall be no leakage, rupture or joint failure throughout the 5 min test period.

7.7 Bending moment (see [6.14](#))

7.7.1 Test method 1

7.7.1.1 The test assembly shall consist of two sections of piping each a minimum of 750 mm long fitted with end caps. The test coupling shall be assembled in accordance with the manufacturer's installation instructions. The bolt pads of the coupling shall be installed horizontally (see [Figure 2](#)).



Key

- 1 pipe section
2 pipe coupling
3 test load (with a maximum contact width or diameter of 30 mm when applied by hydraulic cylinder or similar)
4 support
5 pipe tap
6 pan, 200 · 400 · 60, SS, thickness 2

Figure 2 — Test method 1 bending moment test assembly

7.7.1.2 The bending moment test assembly shall be equipped with a pressure gauge to permit visual verification of the internal pressure being applied.

7.7.1.3 The test assembly shall be filled with water and purged of any entrapped air. Hydrostatic pressure shall be applied to the test assembly and maintained at four times the rated working pressure of the joint for the duration of the test.

CAUTION — Hydrostatic pressure testing requires appropriate safety precautions.

7.7.1.4 A bending moment in accordance with [Table 1](#) shall be applied to the coupling joint and held for a minimum of 10 min.

During this period of time the test force may decrease. However, as soon as the test force drops below 75 % of the force required for generating the bending moment according to [Table 1](#), the test force is increased again to the required level for generating the bending moment according to [Table 1](#).

7.7.1.5 There shall be no leakage, rupture or joint failure throughout the test period.

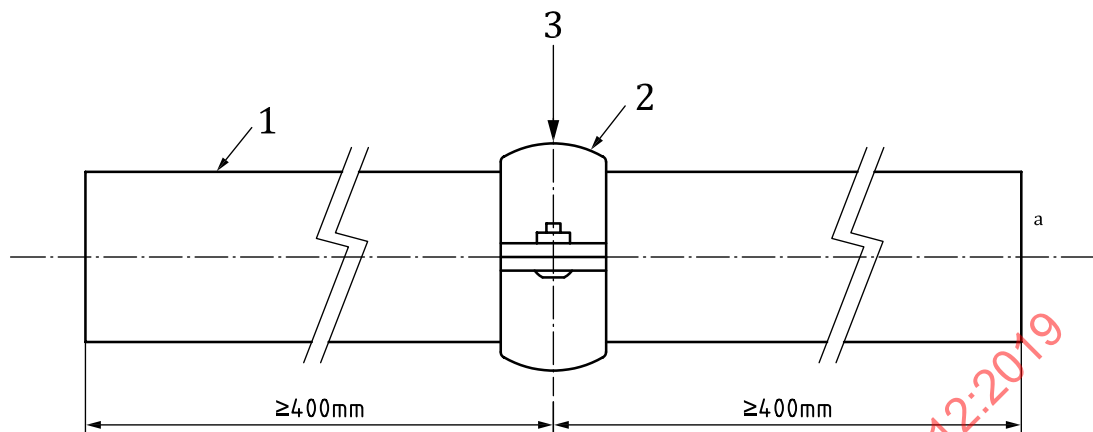
7.7.1.6 If the intention is to consider the coupling as a flexible grooved-end coupling-in conformance with [6.8](#), the required angular displacement shall be observed at a bending moment not exceeding 25 % of the values given in [Table 1](#).

Table 1 — Test method 1 — Applied bending moments^a

Size of coupling mm	Applied bending moment N·m
25	350
32	644
40	858
50	1 000
65	1 280
80	1 950
100	2 940
125	6 130
150	8 830
200	19 080
250	31 800
300	52 560
^a For reducing couplings the dimension of the smaller nominal diameter shall apply for the determination of the bending moment.	

7.7.2 Test method 2

7.7.2.1 The test assembly shall consist of two sections of piping each a minimum of 400 mm long fitted with end caps. The test assembly shall be placed on two supports at a minimum distance of 300 mm from the joint, each with a maximum contact width of 30 mm. The test load shall be applied by an element with a maximum width or diameter of 30 mm. The test coupling shall be assembled in accordance with the manufacturer's installation instructions. The bolt pads of the coupling shall be installed horizontally (see [Figure 3](#)).

**Key**

- 1 pipe section
- 2 pipe coupling
- 3 test load
- a Pipe tap provided in the end.

Figure 3 — Test method 2 bending moment test assembly

7.7.2.2 The bending moment test assembly shall be equipped with a pressure gauge to permit visual verification of the internal pressure being applied.

7.7.2.3 The test assembly shall be filled with water and purged of any entrapped air. Hydrostatic pressure shall be applied to the test assembly and maintained at no less than the rated working pressure of the joint for the duration of the test.

CAUTION — Hydrostatic pressure testing requires appropriate safety precautions.

7.7.2.4 A bending moment in accordance with [Table 2](#) shall be applied to the coupling joint and held for a minimum of 1 min.

7.7.2.5 There shall be no leakage, rupture or joint failure throughout the test period.

7.7.2.6 If the intention is to consider the coupling as a flexible grooved-end coupling in conformance with [6.8](#), the required angular displacement shall be observed at a bending moment not exceeding 25 % of the values given in [Table 2](#).

Table 2 — Test method 2 — Applied bending moments^a

Size of coupling mm	Applied bending moment N·m
25	410
32	570
40	1 100
50	1 560
65	2 400
^a For reducing couplings the dimension of the smaller nominal diameter shall apply for the determination of the bending moment.	

Table 2 (continued)

Size of coupling mm	Applied bending moment N·m
80	3 290
100	4 940
125	7 100
150	9 610
200	15 330
250	22 760
300	31 120

^a For reducing couplings the dimension of the smaller nominal diameter shall apply for the determination of the bending moment.

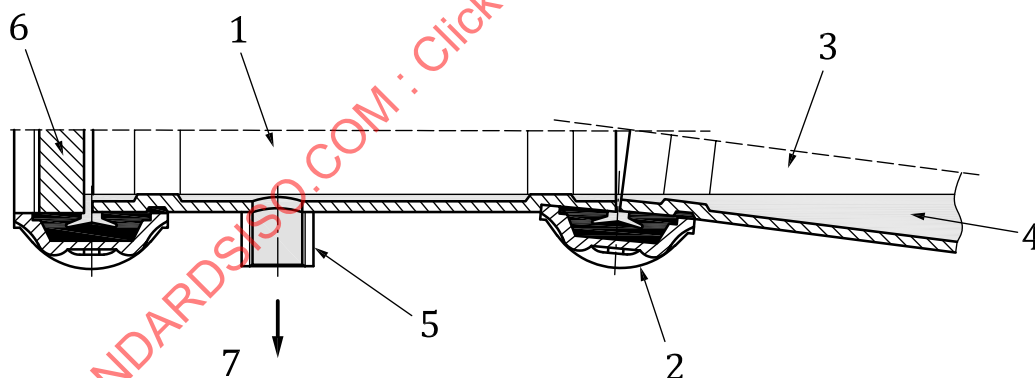
7.8 Fire resistance (see 6.16)

NOTE See 6.16.

7.8.1 The test assembly shall consist of two sections of piping each a minimum of 750 mm long fitted with end caps. The test coupling shall be assembled in accordance with the manufacturer's installation instructions. The bolt pads of the coupling shall be installed horizontally (see Figure 2).

7.8.2 The test assembly is mounted, U-bent, on the test apparatus according to Figure 2 and filled with water. The angle corresponds to the angle documented as a result of the test according to 7.7. Subsequently the test assembly is drained.

NOTE The test assembly is considered to be drained, if just only that amount of the water remains in the test joint which would remain after draining the non-bent pipe end over a rolled groove. See Figure 4.



Key

- 1 non-bent pipe section
- 2 pipe coupling
- 3 bent pipe section
- 4 remaining water
- 5 pipe tap
- 6 end cap
- 7 drain

Figure 4 — Fire resistance test, draining procedure

7.8.3 To the test assembly described in [Figure 2](#) and [Figure 4](#), add a 200 mm by 400 mm by 60 mm stainless steel pan underneath the tested coupling. Methanol, 0,5 l for nominal diameters <DN100 and 1,0 l for nominal diameters ≥DN100, is poured into the pan and ignited. Burning time is 5 min for nominal diameters <DN100 and 8 min for nominal diameters ≥DN100. For reducing couplings, the dimension of the smaller diameter shall apply for the determination of the burning time.

The flame shall be extinguished immediately once the burning time has expired (5 min or 8 min) and the test joint shall be cooled. For cooling, the test joint is immediately sprayed with water until steam formation is no longer visible, but at least for 3 min.

7.8.4 The test joint is then filled completely with water, exposed to a test pressure which corresponds to the rated working pressure and checked visibly for leakage for at least 1 min.

8 Markings

8.1 Housing markings

The following shall be cast in each housing:

- a) name or trademark of manufacturer;
- b) coupling model number;
- c) nominal size, expressed in millimetres, which corresponds to the actual tube or pipe OD for which the coupling is designed;
- d) year of manufacture; couplings produced in the last three months of a calendar year may be marked with the following year as the date of manufacture; couplings produced in the first three months of a calendar year may be marked with the previous year as the date of manufacture;
- e) factory identification, if manufactured at two or more factories.

8.2 Gasket markings

Gaskets shall be moulded with the following information and colour coded to indicate gasket material:

- a) name or trademark of manufacturer;
- b) gasket model number;
- c) nominal size, expressed in millimetres, corresponding to the actual tube or pipe OD for which the corresponding coupling is designed;
- d) year of manufacture; gaskets produced in the last three months of a calendar year may be marked with the following year as the date of manufacture; gaskets produced in the first three months of a calendar year may be marked with the previous year as the date of manufacture;
- e) factory identification, if manufactured at two or more factories;
- f) colour of gasket or colour marking to indicate gasket material; gasket colour or colour marking shall be as follows:
 - 1) ethylene propylene (EPDM) green or violet;
 - 2) nitrile (buna N) orange;
 - 3) silicone rubber red;
 - 4) other material manufacturers' literature to define material.

8.3 Manufacturer's installation instructions

Manufacturer's installation instructions shall include the following:

- a) model number;
- b) sizes available;
- c) material of construction of all components;
- d) detailed assembly procedure;
- e) description of gasket material marking (only for materials other than nitrile, EPDM, and silicone rubber);
- f) roll grooved-end dimensional specifications (standard dimensions as stated in [Annex A](#) or special (non-standard) dimensions);
- g) cut grooved-end dimensional specifications (standard dimensions as stated in [Annex B](#) or special (non-standard) dimensions);
- h) cast grooved-end dimensional specifications (standard dimensions as stated in [Annex C](#) or special (non-standard) dimensions);
- i) Rated working pressure;
- j) assembly procedure for the installation of couplings;
- k) bolt torque specification, where required by the manufacturer;
- l) maximum allowable movement for flexible couplings;
- m) specification for permissible media within the pipe in conjunction with the gasket material (see [8.2](#) for colour codes).

Annex A (informative)

Roll grooved dimensions and tolerances

A.1 Typical roll grooved dimensions and tolerances

Tables A.1 to A.3 represent standard roll grooved dimensions of various countries and correspond to Figure A.1.

Table A.1 — Standard roll grooved dimensions (Japan)

Nominal size	Pipe outside diameter	Gasket seat A	Groove width B	Groove diameter C	Groove depth D	Minimum allowable wall thickness T	Maximum flare F diameter
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
25	34,0 ±0,50	16,0 +0,4/-0,9	7,1 ±0,8	30,4 +0/-1,0	1,80	3,2	36,6
32	42,7 ±0,50	16,0 +0,4/-0,9	7,1 ±0,8	39,1 +0/-1,0	1,80	3,5	45,3
40	48,6 ±0,50	16,0 +0,4/-0,9	7,1 ±0,8	45,0 +0/-1,0	1,80	3,5	51,4
50	60,5 ±0,61	16,0 +0,4/-0,9	8,7 ±0,8	56,9 +0/-1,0	1,80	3,8	63,2
65	—	—	—	—	—	—	—
65	76,3 ±0,76	16,0 +0,4/-0,9	8,7 ±0,8	72,2 +0/-1,0	2,05	4,2	78,9
80	89,1 ±0,89	16,0 +0,4/-0,9	8,7 ±0,8	84,9 +0/-1,0	2,10	4,2	91,6
90	—	—	—	—	—	—	—
100	—	—	—	—	—	—	—
100	114,3 ±1,14	16,0 +0,4/-0,9	8,7 ±0,8	110,1 +0/-1,0	2,10	4,5	116,8
125	—	—	—	—	—	—	—
125	139,8 ±1,40	16,0 +0,4/-0,9	8,7 ±0,8	135,5 +0/-1,0	2,15	4,5	142,3
125	—	—	—	—	—	—	—
150	—	—	—	—	—	—	—
150	165,2 ±1,60	16,0 +0,4/-0,9	8,7 ±0,8	160,8 +0/-1,0	2,20	5,0	167,7
150	—	—	—	—	—	—	—

^a When measuring the groove diameter C in nominal size 200 and over, Table A.4 Circumference of groove diameter should be applied.

Table A.1 (continued)

Nominal size	Pipe outside diameter	Gasket seat A	Groove width B	Groove diameter C	Groove depth D	Minimum allowable wall thickness T	Maximum flare F diameter
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
200	216,3 ±1,73	19,0 ±0,8	11,9 ±0,8	211,6 ^a	2,35	5,8	220,7
250	267,4 ±2,14	19,0 ±0,8	11,9 ±0,8	262,6 ^a	2,40	6,6	271,8
300	318,5 ±2,55	19,0 ±0,8	11,9 ±0,8	312,9 ^a	2,80	6,9	322,8

^a When measuring the groove diameter C in nominal size 200 and over, Table A.4 Circumference of groove diameter should be applied.

Table A.2 — Standard roll grooved dimensions (Germany)

Nominal size	Pipe outside diameter	Gasket seat A	Groove width B	Groove diameter C	Groove depth D	Maximum groove corner radius E	Minimum allowable wall thickness T	Maximum flare F diameter
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
25	33,7 ±0,33	15,88 ±0,76	7,14 ±0,76	30,23 +0/-0,38	1,73	2,0	1,65	36,3
32	42,4 ±0,41	15,88 ±0,76	7,14 ±0,76	38,99 +0/-0,38	1,70	2,0	1,65	45,0
40	48,3 ±0,48	15,88 ±0,76	7,14 ±0,76	45,09 +0/-0,38	1,60	2,0	1,65	51,1
50	60,3 ±0,61	15,88 ±0,76	8,74 ±0,76	57,15 +0/-0,38	1,57	2,0	1,65	63,0
65	73,0 ±0,74	—	8,74 ±0,76	69,09 +0/-0,46	1,95	2,0	2,11	75,7
65	76,1 ±0,76	15,88 ±0,76	8,74 ±0,76	72,26 +0/-0,46	1,92	2,0	2,11	78,7
80	88,9 +0,89/-0,79	15,88 ±0,76	8,74 ±0,76	84,94 +0/-0,46	1,98	2,0	2,11	91,4
90	—	—	—	—	—	—	—	—
100	108,0 +1,09/-0,79	—	—	103,73 +0/-0,51	2,13	2,0	2,11	110,5
100	114,3 +1,14/-0,79	15,88 ±0,76	8,74 ±0,76	110,08 +0/-0,51	2,11	2,0	2,11	116,8
125	133,0 +1,35/-0,79	—	8,74 ±0,76	129,13 +0/-0,51	1,93	2,0	2,77	135,9
125	139,7 +1,42/-0,79	15,88 ±0,76	8,74 ±0,76	135,48 +0/-0,51	2,11	2,0	2,77	142,2
125	—	—	—	—	—	—	—	—
150	159,0 +1,60/-0,79	15,88 ±0,76	8,74 ±0,76	154,5 +0/-0,56	2,25	2,0	2,77	161,3
150	165,1 +1,60/-0,79	15,88 ±0,76	8,74 ±0,76	160,78 +0/-0,56	2,16	2,0	2,77	167,6
150	168,3 +1,60/-0,79	—	8,74 ±0,76	163,96 +0/-0,56	2,17	2,0	—	170,9

Table A.2 (continued)

Nominal size	Pipe outside diameter	Gasket seat A	Groove width B	Groove diameter C	Groove depth D	Maximum groove corner radius E	Minimum allowable wall thickness T	Maximum flare F diameter
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
200	219,1 +1,60/-0,79	19,05 ±0,76	11,91 ±0,76	214,4 +0/-0,64	2,35	1,5	2,77	223,5
250	273,0 +1,60/-0,79	19,05 ±0,76	11,91 ±0,76	268,28 +0/-0,69	2,36	1,5	3,40	277,4
300	323,9 +1,60/-0,79	19,05 ±0,76	11,91 ±0,76	318,29 +0/-0,76	2,80	1,5	3,96	328,2

Table A.3 — Standard roll grooved dimensions (United States)

Nominal size	Pipe outside diameter	Gasket seat A	Groove width B	Groove diameter C	Groove depth D	Minimum allowable wall thickness T	Maximum flare F diameter
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
25	33,4 ±0,33	15,88 +0,38/-0,76	7,14 +0,76/-0,38	30,23 +0/-0,38	—	1,65	—
32	42,2 ±0,41	15,88 +0,38/-0,76	7,14 +0,76/-0,38	38,99 +0/-0,38	—	1,65	—
40	48,3 ±0,48	15,88 +0,38/-0,76	7,14 +0,76/-0,38	45,08 +0/-0,38	—	1,65	—
50	60,3 ±0,61	15,88 +0,38/-0,76	8,74 +0,76/-0,38	57,15 +0/-0,38	—	1,65	—
65	73,0 ±0,74	15,88 +0,38/-0,76	8,74 +0,76/-0,38	69,09 +0/-0,38	—	2,11	—
65	—	—	—	—	—	—	—
80	88,9 +0,89/-0,79	15,88 +0,38/-0,76	8,74 +0,76/-0,38	84,94 +0/-0,38	—	2,11	—
90	101,6 +1,02/-0,79	15,88 +0,38/-0,76	8,74 +0,76/-0,38	97,38 +0/-0,51	—	2,11	—
100	—	—	—	—	—	—	—
100	114,3 +1,14/-0,79	15,88 +0,38/-0,76	8,74 +0,76/-0,38	110,08 +0/-0,38	—	2,11	—
125	—	—	—	—	—	—	—
125	—	—	—	—	—	—	—
125	141,3 +1,42/-0,79	15,88 +0,38/-0,76	8,74 +0,76/-0,38	137,03 +0/-0,38	—	2,77	—
150	—	—	—	—	—	—	—
150	—	—	—	—	—	—	—
150	168,27 +1,60/-0,79	15,88 +0,38/-0,76	8,74 +0,76/-0,38	163,96 +0/-0,38	—	2,77	—
200	219,08 +1,60/-0,79	19,05 +0,38/-0,76	11,91 +0,76/-0,38	214,40 +0/-0,51	—	2,77	—
250	273,1 +1,60/-0,79	19,05 +0,38/-0,76	11,91 +0,76/-0,38	268,27 +0/-0,64	—	3,40	—
300	323,85 +1,60/-0,79	19,05 +0,38/-0,76	11,91 +0,76/-0,38	318,29 +0/-0,64	—	3,96	—

Table A.4 — Circumference of groove diameter $C_{x\pi}$ (alternative method)

Circumference of groove diameter $C_{x\pi}$ (alternative method)		
Nominal size	Japan	Germany
25	95,5 +0/-3,1	95 +0/-1,2
32	122,8 +0/-3,1	122,5 +0/-1,2
40	141,4 +0/-3,1	141,7 +0/-1,2
50	178,8 +0/-3,1	179,5 +0/-1,2
65	—	217,1 +0/-1,5
65	226,8 +0/-3,1	227 +0/-1,4
80	266,7 +0/-3,1	266,8 +0/-1,4
90	—	—
100	—	325,9 +0/-1,6
100	345,9 +0/-3,1	345,8 +0/-1,6
125	—	405,7 +0/-1,6
125	425,7 +0/-3,1	425,6 +0/-1,6
125	—	—
150	—	485,4 +0/-1,8
150	505,2 +0/-3,1	505,1 +0/-1,8
150	—	515,1 +0/-1,8
200	664,8 +0/-3,1	673,6 +0/-2,1
250	825,0 +0/-3,1	842,8 +0/-2,1
300	983,0 +0/-3,1	999,9 +0/-2,4

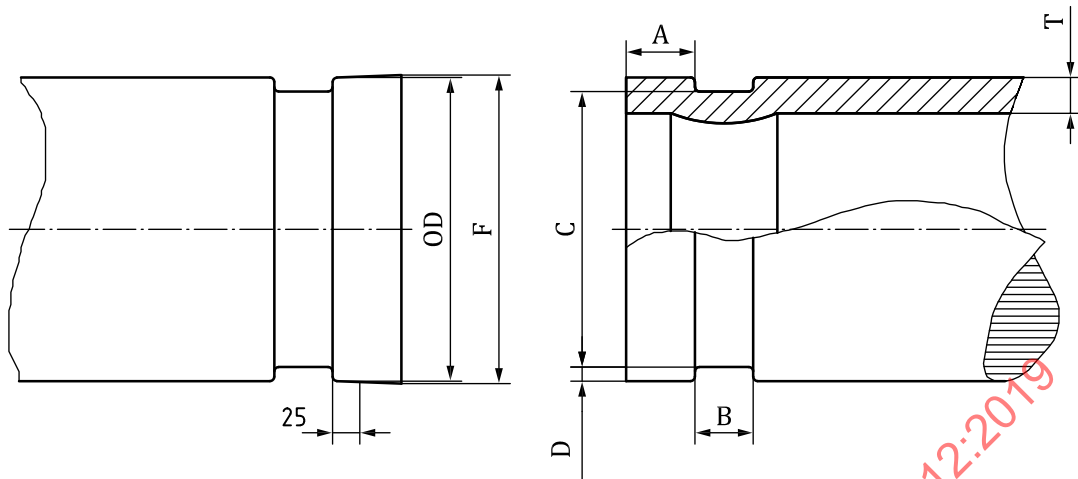


Figure A.1 — Roll grooved-end dimensional reference points from [Tables A.1](#), [A.2](#) and [A.3](#)

Annex B (informative)

Cut grooved dimensions and tolerances

B.1 Typical cut grooved dimensions and tolerances

The following tables contain the standard cut grooved dimensions and tolerances of various countries.

Table B.1 — Standard cut grooved dimensions (Japan)

Nominal size	Pipe outside diameter (mm)	Gasket seat A (mm)	Groove width B (mm)	Groove diameter C (mm)	Groove depth D (mm)	Minimum allowable wall thickness T (mm)	Maximum flare F diameter (mm)
25	34,0 ±0,50	16,0 +0,4/-0,9	7,1 ±0,8	30,4 +0/-1,0	1,80	3,2	36,6
32	42,7 ±0,50	16,0 +0,4/-0,9	7,1 ±0,8	39,1 +0/-1,0	1,80	3,5	45,3
40	48,6 ±0,50	16,0 +0,4/-0,9	7,1 ±0,8	45,0 +0/-1,0	1,80	3,5	51,4
50	60,5 ±0,61	16,0 +0,4/-0,9	8,7 ±0,8	56,9 +0/-1,0	1,80	3,8	63,2
65	—	—	—	—	—	—	—
65	76,3 ±0,76	16,0 +0,4/-0,9	8,7 ±0,8	72,2 +0/-1,0	2,05	4,2	78,9
80	89,1 ±0,89	16,0 +0,4/-0,9	8,7 ±0,8	84,9 +0/-1,0	2,10	4,2	91,6
90	—	—	—	—	—	—	—
100	—	—	—	—	—	—	—
100	114,3 ±1,14	16,0 +0,4/-0,9	8,7 ±0,8	110,1 +0/-1,0	2,10	4,5	116,8
125	—	—	—	—	—	—	—
125	139,8 ±1,40	16,0 +0,4/-0,9	8,7 ±0,8	135,5 +0/-1,0	2,15	4,5	142,3
125	—	—	—	—	—	—	—
150	—	—	—	—	—	—	—
150	165,2 ±1,60	16,0 +0,4/-0,9	8,7 ±0,8	160,8 +0/-1,0	2,20	5,0	167,7
150	—	—	—	—	—	—	—
200	216,3 ±1,73	19,0 ±0,8	11,9 ±0,8	216,6 ^a	2,35	5,8	220,7
250	267,4 ±2,14	19,0 ±0,8	11,9 ±0,8	262,6 ^a	2,40	6,6	271,8
300	318,5 ±2,55	19,0 ±0,8	11,9 ±0,8	312,9 ^a	2,80	6,9	322,8

^a When measuring the groove diameter C in nominal size 200 and over, Table B.4 Circumference of groove diameter should be applied.